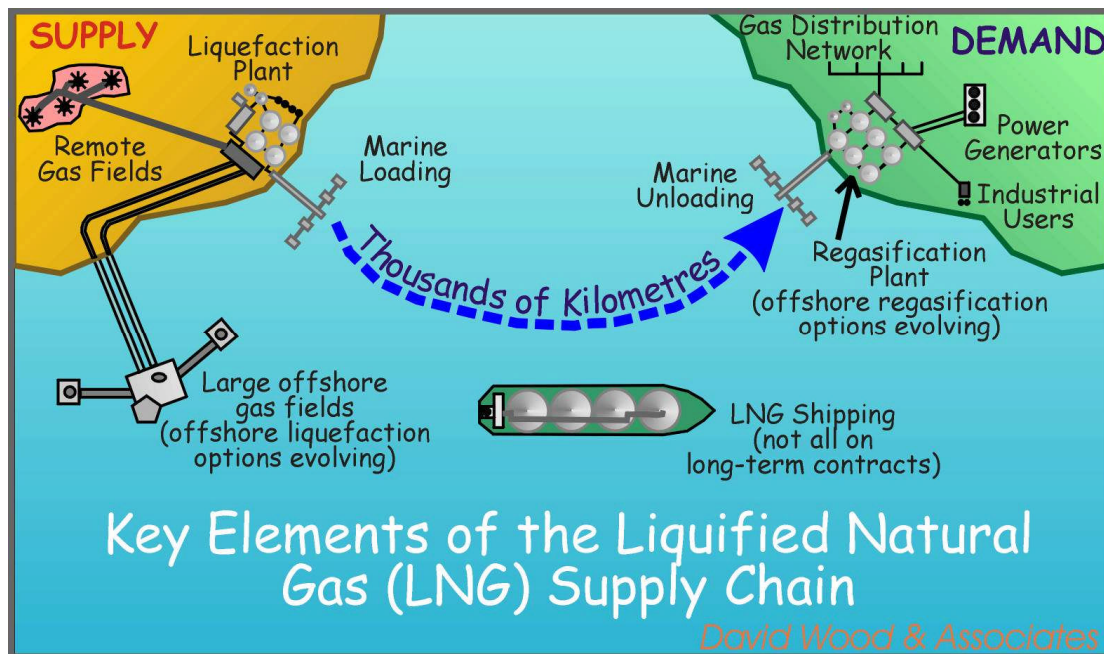


# LNG Poised to Significantly Increase its Share of Global Gas Market

David Wood February 2004 Petroleum Review p.38-39

For the past few years LNG has experienced high levels of activity and investment in all sectors of its long-distance supply chain (Figure 1) and market indications suggest that it will continue to do so. Despite an impressive average year-on-year growth rate of some 6% since the 1960's, when the first commercial LNG cargoes left Algeria for Europe, it is only now that the market dynamics seem set to enable LNG to compete effectively in gas markets across the globe. Supply constraints associated with domestic North American gas for the US market are driving LNG supply opportunities in that market. New LNG receiving facilities and gas distribution infrastructure under construction in China are about to open up that market. However, it is the proliferation of new liquefaction trains, shipping, regasification terminals and evolving LNG contracting and pricing worldwide that is enabling LNG to make a step change in its contribution to the global gas market.



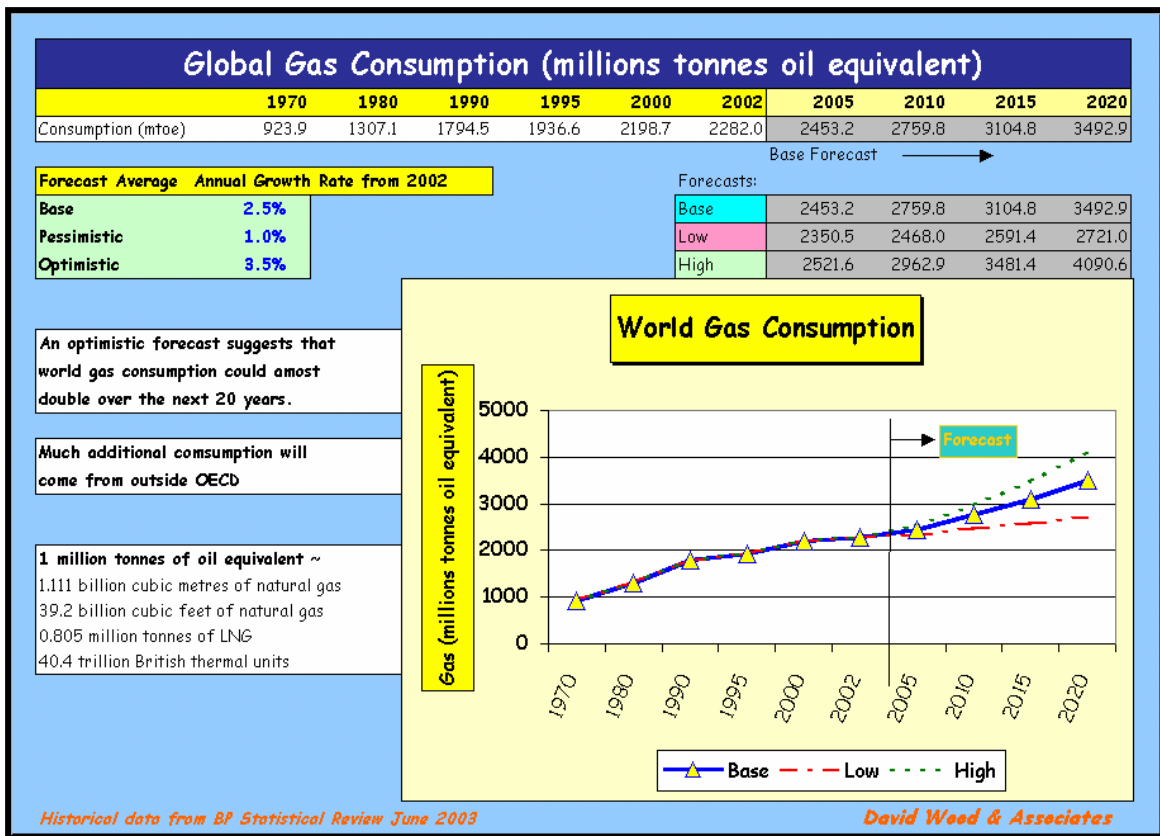
**Figure 1. Diagrammatic representation of the LNG supply chain**

Until recently almost all LNG was sold to long-term customers that formed part of single dedicated LNG supply chains with prices indexed to crude oil and/or fuel products derived from oil. Such contracts still underpin the industry, but significant changes have occurred in recent years including: more competition in supply – larger trains and lower unit costs of newer plants (~\$175/mt/year in 2003); deregulation in import markets; short-term trading of LNG cargoes; freelance LNG shipping. Such changes have opened up opportunities for gas buyers and sellers that improve the ongoing competitiveness of LNG.

If the US market opens up to LNG as forecast and cargoes continue to be sold at prices related to the Henry Hub benchmark more transparent pricing should be expected globally for both the LNG commodity and its transportation. The evolution of a short-term LNG market, operating in parallel with traditional long-term supply deals, takes the industry one step closer to a globalised natural gas market involving more extensive LNG spot and futures trading.

### Global Gas Demand

The global appetite for gas as the fuel of choice is gathering pace. Many analysts expect global gas consumption to approximately double by 2020 and exceed more than 4000 million tons of oil equivalent per year. Figure 2 shows a range of gas consumption forecasts, the uncertainty associated with these depends upon a range of issues, including: global economic development; regulatory and political constraints; investment in gas infrastructure (pipelines and LNG); gas prices; and alternative fuel initiatives and developments.



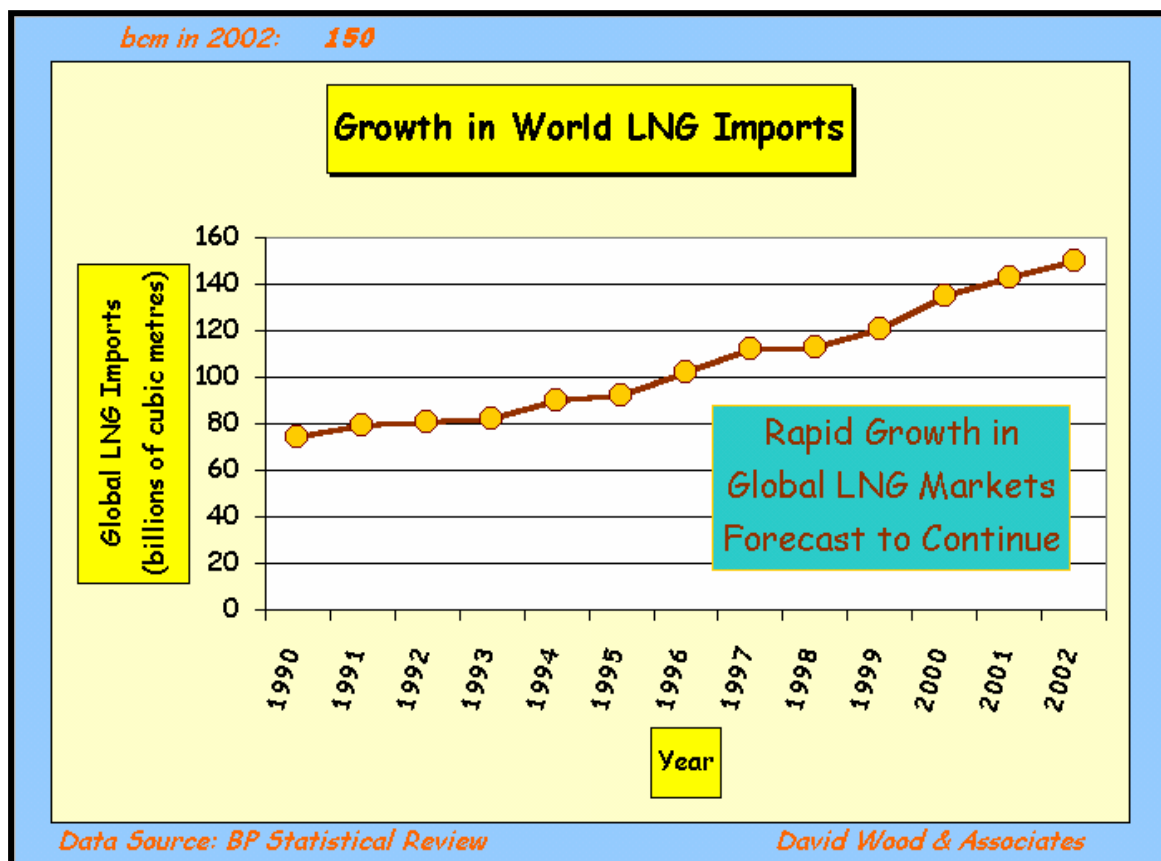
**Figure 2. Global Gas Consumption: History and Forecasts**

Accelerated growth in global gas demand should also boost LNG opportunities. Remaining gas resources identified globally appear more than sufficient to meet increased demand. The problem is that they are not located close to the major markets. Less than 10% of the 155 trillion cubic metres (5500 tcf) of proved gas reserves (2002) are located in OECD countries (36% in FSU; 36% in Middle East; 18% in emerging economies). Moreover, converting undeveloped resources of stranded gas isolated from the main markets requires significant investment and strategies to mitigate the myriad of risks (technical, regulatory, environmental, fiscal, political and financial) that confront major energy development projects. LNG supply

projects associated with stranded gas fields can compete effectively with other energy sources, particularly if the current investment in expanding the LNG receiving terminals, gas storage and distribution infrastructure in major markets is sustained.

### Global LNG Consumption

According to the BP statistical Review (June, 2003) annual global gas production in 2002 was 2527.6 billion cubic metres. International trade movements in gas by pipeline were 431.35 billion cubic metres (17.1% of global production) compared to international trade movements in LNG of 149.99 billion cubic metres (5.9% of global production). This leads to the conclusion that ~83% of global gas consumption is used domestically within national borders (US and Russia accounting for most of this). Why then all the fuss about LNG? It seems to represent only a minor share of the global gas market? Its significance lies in its continued expansion (Figure 3), diversification and ability to bring stranded gas reserves into the main markets avoiding the political and technical issues associated with transporting gas by pipeline across national borders, extreme terrains and oceans. It also serves as a competitive force in gas pricing and can offer security of supply to those regions dependent on pipeline gas from a limited number of pipeline gas suppliers (e.g. Western Europe). All the major gas markets have a vested interest in sustaining and developing global LNG supplies.

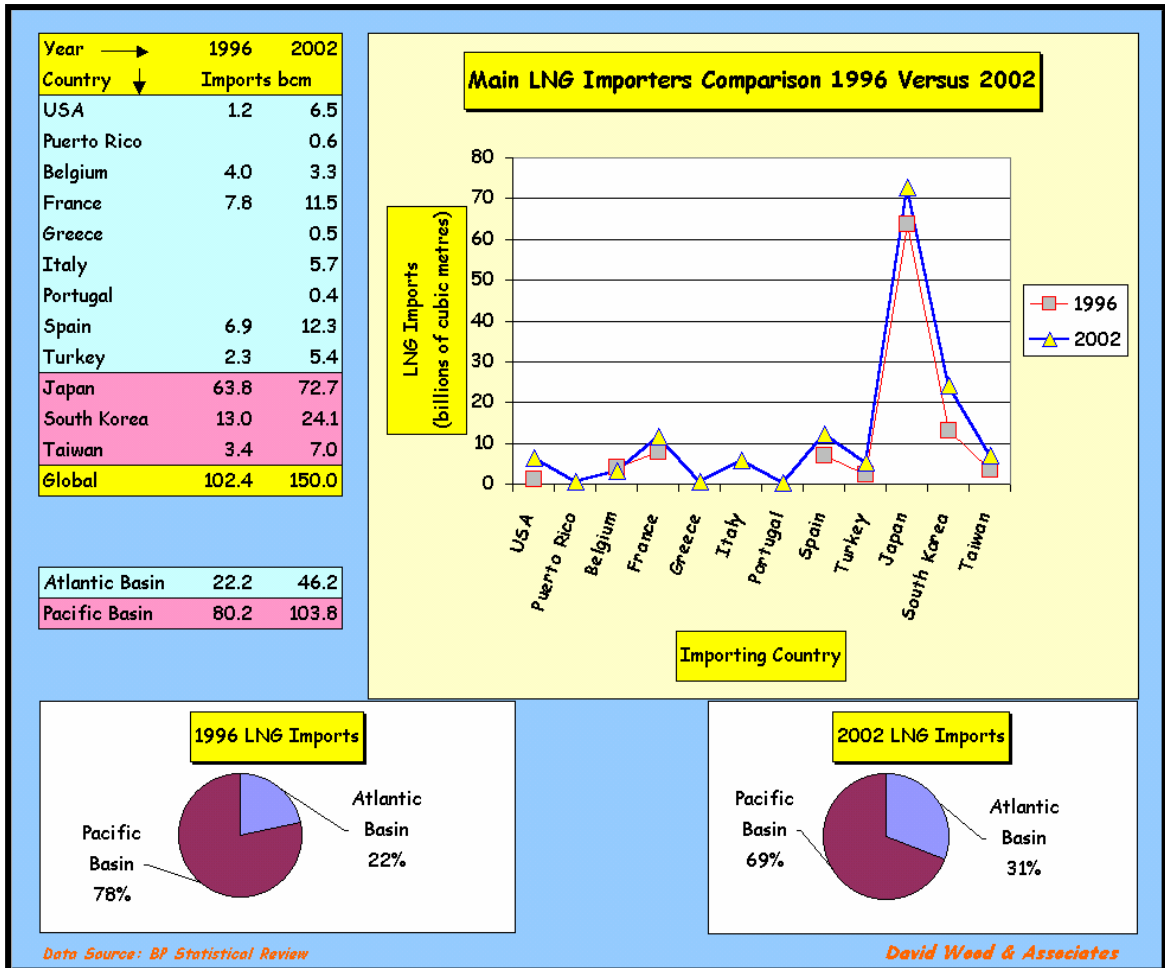


**Figure 3. Recent Global LNG Consumption Growth**

LNG is now expected to meet at least 10% of global gas demand by 2010 and perhaps 15% by 2020 depending particularly upon developments in the US gas market.

## Diversification & Fragmentation of Traditional LNG Markets

Until recently the LNG markets have been conveniently separated into the Pacific and Atlantic Basins. The Pacific basin has dominated demand and the US has represented only a minor consumer within the Atlantic Basin. Figure 4 highlights the continued dominance of Japan but also the diversification and expansion that has occurred in recent years within the Atlantic LNG basin.



**Figure 4 LNG Imports to the Atlantic and Pacific Basins 1996 and 2002.**

The current evolution of the US LNG market makes it no longer valid to consider the East Coast US and Europe as part of a single Atlantic market and West Coast US and Asia as part of a single Pacific market. The market dynamics in all of these regions differ significantly from each:

**Southeast Asia:** Historically this region has been the dominant market for LNG. The region is short of gas (and oil) reserves and lacks integrated regional gas pipeline networks. Long-term agreements involving LNG have enabled buyers to secure supply and will continue to do so. However, emerging LNG markets in China and India, and volatile economic growth rates within the region should provide more opportunities to trade short-term LNG both within Asia and to the other markets, so more flexible supply contracts are evolving. Short-term LNG supply surpluses can be

expected in this region as the new markets develop and existing markets recover from economic recession. In recent years South Korea's gas market has expanded more rapidly than Japan's with Kogas replacing Tepco in 2002 as the world's largest LNG purchasing entity.

**Western Europe:** Over the past 50 years an extensive and integrated gas pipeline grid (>200,000 km) has been developed in this region linking it to pipeline supplies from Russia, North Africa (primarily Algeria) and the North Sea (primarily Norway and Netherlands). LNG has represented minor price competition and provided security of gas supply to several countries (e.g. France & Spain) during this period. As market liberalisation progresses within the region shorter-term LNG agreements are expected to play a more important role as seen in Spain, France, Italy and Turkey in recent years (Figure 4). The decline of UK's gas reserves and future supply issues have started to hit the UK domestic gas market and future pipeline gas supply contracts are now being established with Norway and are ongoing with Russia. Significantly, longer-term LNG contracts (e.g. with Qatar) to supply the UK from 2007 are also to play an expanding role providing security and diversification of supply. Challenges and opportunities facing LNG gas suppliers into the European market include: the ongoing regulatory changes related to market liberalisation centred on the EU Gas Directive opening the market to full competition; limited availability of underground gas storage close to major consumption areas; price competition from the big four pipeline gas suppliers that together hold sufficient reserves to supply most of Europe for the next 30 years.

**United States:** a significant change has occurred in the US market over the past few years. Historically it has been able to meet growing gas demand from domestic production or through gas imports by pipeline from Canada with LNG amounting to less than 1% of the gas mix. Gas production and commercially proved reserves in US and Canada are in decline and traditional sources of gas supply to the domestic market can no longer be relied upon to meet growing demand. Gas prices well in excess of \$5 / mmbtu during winter 2002 /03 and the historical low point of gas storage levels reached in June 2003 testify to the pressures on gas supply.

The US has a vast network of gas pipelines and some 4tcf of working gas storage, concentrated on moving gas through the Gulf of Mexico to the mid-west to the major East Coast markets. Gas trading forms part of the sophisticated US commodity and derivatives markets. As LNG imports to US expand a highly liquid LNG spot and futures market will undoubtedly develop.

Many forecasts, such as those from the Energy Information Authority (EIA – department of the US Government) suggest that domestic US production will remain flat over the next 20 years based upon high levels of investment in drilling for deep gas and unconventional gas sources (e.g. coal-bed methane). Such forecasts suggest that growth will be met by a combination of unconventional sources, arctic Canadian and Alaskan gas and LNG. An Alaskan gas pipeline is currently forecast to cost some US\$12 billion and take 4 years to build and not to come onstream until 2020. A Mackenzie Delta gas pipeline linking arctic gas from Canada into the US grid could be onstream by 2016. Neither of these projects are likely to supply cheap gas.

If US domestic gas production declines more rapidly than predicted by EIA, and many in the industry would not bet against such an outcome, the requirements for LNG to meet US gas demand in the medium-term could be much higher than predicted - up to 10% of the market by 2010. The proliferation of current projects (now exceeding 20) to build new LNG import terminals within the US (and in neighbouring Mexico) to supplement the 5 existing terminals indicates that many companies and organisations also recognise a rapidly increasing role for LNG. One issue that is currently being addressed in the US is how to make LNG interchangeable with pipeline gas. Most LNG has a calorific value of between 1100 and 1180 btu/cf, but US pipeline gas is leaner (1025 to 1060 btu/cf), because NGL's are stripped from it for use as refinery feedstocks. LNG therefore requires treatment to lower its calorific value for entry into the pipeline grid. How such treatment should be performed, together with planning regulations and environmental and safety issues, are delaying the approvals of some of the planned LNG receiving terminals. LNG regasification plants are being located in Mexico (Baja California to supply the West Coast US market) and offshore to ease some of the environmental and other regulatory objections being raised within the US. It is clear that over the next few years the infrastructure will be in place for the US to receive LNG along the East, West and Gulf coasts to meet demand for gas imports.

### **Conclusions**

The fundamentals of supply, demand and infrastructure that underpin the LNG industry are all strengthening. Extensive investment worldwide to build new liquefaction and regasification plants and shipping at lower unit capital costs, due to technological advances and economies of scale, are expanding capacity and making LNG more competitive with pipelined gas. Increasing liquidity in the LNG shipping market and an evolving short-term LNG spot market means greater market flexibility to accompany the security of supply that continues to be provided by the long-term LNG supply contracts, which still underpin most LNG supply chains. Several major companies have responded to the changing LNG market dynamics and have developed strategies to exploit opportunities in the three distinct regional markets as the LNG industry continues to expand and diversify.

### **Author**

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